RIDOLFI
Environmental

M E M O R A N D U M

DATE: January 5, 2015

TO: Native Village of Tyonek
Heather Kendall-Miller, Native American Rights Fund

FROM: RIDOLFI (Bill Beckley, Bruno Ridolfi, Callie Ridolfi, Sherrie Duncan, Tom Bowden)

SUBJECT: **Review of Preliminary Draft Supplemental Environmental Impact Statement (PDSEIS) for the Chuitna Coal Project**

We have completed a review of the subject document and compiled both general and specific comments. Our review highlights and general comments are summarized below and are focused on issues that we believe are of key importance in recognizing and evaluating the potential impacts of this project.

Our specific comments are provided in the format prescribed by the U.S. Army Corps of Engineers (USACE) when the PDSEIS was released for cooperating agency review on November 10, 2015.

Review Highlights

Document Completeness – The PDSEIS document is incomplete and does not adequately identify, quantify, and evaluate potential impacts as required by the National Environmental Protection Act (NEPA) and as necessary to determine if significant degradation will result from the construction and operation of the Chuitna Coal Project. A complete revised draft of the SEIS should be provided to cooperating agencies for review and additional comments before the draft SEIS is released to the public.

Reasonable Range of Alternatives – The PDSEIS includes four alternatives, a no-action alternative and three action alternatives. The three action alternatives are not substantially different and do not represent a reasonable range of alternatives as required by NEPA. The SEIS should evaluate at least two action alternatives that involve production levels that are less than the maximum of 12 million metric tons per year.

Impacts to Geology, Hydrology, and Aquatic Resources – The PDSEIS indicates that the high-intensity and long-term impacts to geology, hydrology, and aquatic resources can be mitigated by selectively replacing overburden materials and soils to "replicate" the stratigraphy and physical properties of the geologic and hydrologic setting that currently exist. Such claims are unfounded, and there are no comparable projects that demonstrate the ability or feasibility of

replicating the geology, hydrology, and aquatic resources of an area like the upper Chuitna Watershed after it has been subjected to the intensive impacts of surface coal mining. The intense and severe impacts to the geology, hydrology, aquatic habitat, fish, and wildlife will alter the ecology and natural resources of the area for over 50 years. The SEIS should recognize, quantify, and evaluate these impacts to determine the environmental and socioeconomic consequences of removing the upper Chuitna Watershed. To the extent that mitigation measures are proposed, the SEIS should describe the impact to these natural resources in the event that mitigation measures fail partially or completely.

Because several streams, tributaries, wetlands, and ponds will be removed, several fish species will be impacted, including Chinook salmon, which is in decline in the Chuitna watershed. Removing streams, tributaries, wetlands, and ponds from a watershed for over 50 years will adversely impact and may eradicate anadromous and resident distinct fish population stocks. The PDSEIS minimizes these impacts by projecting successful mitigation. The potential impacts on fish and wildlife associated with unsuccessful mitigation should be recognized and thoroughly evaluated in the SEIS.

Climate Change Impacts – The Chuitna Coal Project poses major impacts related to climate change, which in large part cannot be avoided or mitigated. The assumption stated in the PDSEIS that Chuitna coal will replace some other coal, rather than being burned in addition to other coal, should be thoroughly evaluated, and the potential impact of burning Chuitna coal in addition to other coals and releasing up to 18 million metric tons per year of GHG emissions and other air pollutants into the atmosphere should be recognized, quantified, and evaluated in the SEIS.

Human Health Impacts – The evaluation of environmental consequences related to human health is still to be completed pending finalization of a Health Impact Assessment (HIA) for the proposed project. The information in the PDSEIS (Section 3.24) does not provide a basis for evaluating project impacts to human health and fails to make critical connections between project impacts on subsistence resources, cultural resources, socioeconomic impacts, and human health.

Socioeconomic Impacts – The PDSEIS does not address sport fishing and the economic impacts related to losses of the sport fishery in the area. According to Alaska Department of Fish and Game (ADFG), the Chuitna River is the most productive Chinook salmon river flowing in to the West Cook Inlet Management Area (WCIMA), and the river is the most popular Chinook salmon sport fishery in the WCIMA. However, the Chinook stock in the Chuitna River is in decline and in 2010 and is considered a "stock of management concern."

The PDSEIS does not adequately consider or evaluate the impacts to the region if the already identified Chinook salmon stock of concern is further reduced by this project. Salmon fisheries are a renewable resource if their watersheds are healthy and intact, but once a watershed is

destroyed it can have long-lasting economic impacts to a region in the form of reduced or eradicated stocks which ultimately result in closed commercial, sport, and subsistence fisheries.

The PDSEIS does not adequately identify and evaluate economic impacts related to the potential loss of reliable protein food resources for subsistence residents in Tyonek and Beluga. Negative impacts to subsistence resources would further burden the economic stability of the subsistence users in the area, since they would be required to travel long distances to populated areas across Cook Inlet, via boat or plane, to obtain food.

The discussion of socioeconomic impacts on the Native Village of Tyonek (Section 3.20) is focused on what are considered to be high intensity, beneficial effects related to employment and income. However, this section fails to adequately evaluate the potentially adverse impacts to the subsistence economy of the community from "15 to 20 percent of the total adult population" being employed by the mine and potentially unavailable to participate in community subsistence and cultural activities. The discussion of socioeconomic impacts should include an evaluation of the potential adverse, and potentially long-term, impacts to the subsistence economy and culture (including the passing on of traditional ecological knowledge) of the Native Village of Tyonek if 15 to 20 percent of the adult population is employed by the Chuitna Coal Project outside the Native community for one or two generations.

Mitigation Effectiveness and Reasonably Foreseeable Significant Adverse Impacts – The PDSEIS proposes measures to mitigate impacts to wetlands, other surface waters, and site hydrology that are unprecedented in scale and complexity, and whose effectiveness is unproven and highly uncertain. The PDSEIS should thoroughly discuss the predicted effectiveness of measures to mitigate impacts, including providing evidence to demonstrate the effectiveness of the proposed measures, and provide an in-depth evaluation of potential environmental consequences should the proposed measures be partly or wholly unsuccessful.

The PDSEIS does not address potentially catastrophic consequences resulting from accidents, such as fuel spills, or the failure of proposed mitigation measures to restore the hydrologic balance or the ecological function of impacted streams and wetlands. Given the scale, complexity, and location of the proposed project, the possible failure of resource mitigation measures or failure of measures to prevent accidental chemical releases are reasonably foreseeable and should be discussed.

General Comments

Document Completeness

This Preliminary Draft Supplemental Environmental Impact Statement (PDSEIS) is incomplete. For example, the chapter on Environmental Justice is a placeholder, the discussion of Human Health Impacts is incomplete, and the Cultural Resources evaluation "may be revised considerably prior

to the Draft." Although these sections represent only a small part of the whole document, they are of great importance and should be appropriately integrated into the SEIS. A thorough and comprehensive review of the SEIS cannot be completed until all sections are complete and all the information needed to fully evaluate impacts is provided. We recommend that the PDSEIS be revised to address and incorporate comments from the Cooperating Agencies (CAs), and a revised draft SEIS be produced and distributed to the CAs for follow up review and comments. This revised draft should be provided to the CAs before the SEIS is released for public review.

In addition to the PDSEIS, the complete mine permit application, prepared in accordance with the Alaska Surface Coal Mining Control and Reclamation Act (ASCMCRA), should be provided to adequately inform the CAs review of the SEIS with respect to mining operations, mine production, storm water management, erosion and sediment control, protection of the hydrologic balance, sequence of overburden removal and reclamation, and other aspects of mine construction and operations that will impact the permit area and adjacent areas.

Cultural Resources

Several statements contained in the Cultural Resources chapter are contradictory and complicate a meaningful review of potential impacts. For example, the following statements are included regarding the impacts of Alternative 2:

> "Of the 80 total resources identified to date…11 are located within the project disturbance footprint of Alternative 2, and three are within 100 feet of the disturbance footprint area. These sites would be directly or indirectly impacted by the implementation of Alternative 2."
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> "Under Alternative 2, no sites would be located within 100 feet of the disturbance footprint of the mine site and facilities with the nearest known site located 1.4 miles from the mine site (TYO-00308). Therefore, there would be no effect to surveyed cultural resources as a result of the mine site and facilities."

This important chapter should be reviewed for accuracy, revised, and redistributed for Cooperating Agency review.

Reasonable Range of Alternatives

The PDSEIS includes four alternatives, a no-action alternative and three action alternatives. Each of the action alternatives assumes a mining operation with the capacity to produce 12 million metric tons per year (MTPY) of marketable coal. The differences between the three full-production alternatives include relocation surface facilities from one side of the mine plan area to another and building an overland conveyor close to the ground, rather than an elevated conveyor. In our opinion, these three alternatives are not substantially different and do not

represent a reasonable range of alternatives as required by the National Environmental Policy Act (NEPA). We recommend that the USACE develop and evaluate at least two action alternatives that involve production levels that are less than the maximum of 12 million MTPY. For example, it may be appropriate to consider alternatives with production rates in the range of 4 to 8 million MTPY.

PacRim Coal's stated Purpose of and Need for the Action is unreasonably narrow to the point that it frustrates one of the principal safeguards of the NEPA process, the mandatory consideration of a range of reasonable alternatives. Such a limitation defeats NEPA's mandate to "[r]igorously explore and objectively evaluate all reasonable alternatives." This narrow purpose also limits the ability of the PDSEIS to reflect alternatives that may limit environmental degradation, and better protect cultural and subsistence resources, and provides little rationale for demonstrating that the USACE has appropriately selected the "least environmentally damaging practicable alternative."

Mine Operations and Reclamation Plan

The impacts to geology, hydrology, fish, wildlife, and other natural resources cannot be thoroughly assessed, and the probable effectiveness of proposed mitigation measures cannot be adequately demonstrated, without detailed plans and information describing mine development, operations, and reclamation. The descriptions, drawings, schematics and other information provided in the PDSEIS are preliminary, conceptual, and inadequate to accurately evaluate potential impacts, protective measures, and mitigation measures.

As described in the PDSEIS, proposed mine operations would include one dragline with a 45- to 61-cubic meter bucket (59- to 80-cubic yard bucket), three (3) hydraulic shovels with 20- to 31-cubic meter buckets, and three (3) loaders. Based on the proposed capacity of this mining operation (12 million metric tons per year), and comparing the proposed project to other surface coal mines at which dragline overburden strip mining is used, the overburden removal capacity of one dragline and three shovels is probably insufficient to uncover, mine, and produce up to 12 million metric tons of coal per year and accomplish the contemporaneous reclamation that would be required by regulations of the Alaska Surface Coal Mining Control and Reclamation Act (ASCMCRA). This is one aspect of the proposed project that should be clarified in the ASCMCRA permit applications and a subsequent draft of the SEIS.

Impacts to Geology and Hydrology

The PDSEIS indicates that the high-intensity and long-term impacts to geology and hydrology can be mitigated by segregating and replacing overburden materials to "replicate" the stratigraphy and physical properties of the geologic and hydrologic setting that currently exist. This claim is unfounded and there are no comparable projects that demonstrate the ability or feasibility of replicating the geology and hydrology of an area like the upper Chuitna Watershed

after it has been subjected to the intensive impacts of surface coal mining. Such restoration would be unprecedented, and it's highly probable that it would be infeasible, both physically and economically, and thus entirely unsuccessful.

During overburden removal in a strip mining operation, a large portion of the existing in-place geologic sequence of soils and rock will be broken, excavated, and moved from the upper part of the sequence to a lower part of the sequence. This handling of overburden involves breaking the overburden material with blasting or ripping to facilitate excavation by draglines, shovels, and loaders. The overburden is removed by dragline casting and shovel or loader to truck haulage to uncover the coal to be mined. This overburden is cast or hauled back into the "spoil" piles within the previously mined strip. This spoil material is broken, loose, and unconsolidated and has very different physical properties than the in-place or "bank" material had before breakage and excavation. The increase in volume between a block of bank overburden material and the corresponding loose material in the spoil piles is usually 20 to 30 percent. This increase in volume from bank to loose cubic yards is known as the "swell factor." The increase in volume, or swell, is due to increased voids or space between the particles of soils and rock in the overburden spoils. The loose material with increased voids transmits water more readily and this results in a substantially greater permeability and higher transmissivity in the loose overburden material.

In the PDSEIS, replacement and replication of the pre-mining geologic and hydrologic setting is proposed, and the same hydrogeologic conditions that were used to describe existing conditions are also assumed for post-mining conditions; however, there is virtually no possibility that the post-mining hydrogeologic properties will be the same as those under current hydrogeologic conditions. The existing groundwater model should be used to evaluate a much broader suite of potential post-mining conditions. For example, if the hydrostratigraphy is not replicated in the post-mining condition, what will the effects be on base flow to streams and other groundwater characteristics?

The impractical and infeasible assumptions that were used in the PDSEIS should be recognized, and references to, descriptions of, and claims related to replicating or replacing the geologic and hydrologic setting during surface coal mining and reclamation operations should be removed from the SEIS. The potential environmental consequences resulting from the inability to replicate pre-mining geologic and hydrologic conditions should be recognized, fully evaluated, and disclosed, and the irreversible and irretrievable commitment of resources associated with these environmental consequences should be recognized and evaluated in the SEIS.

Dredging, Excavation, and Removal of Wetlands

A Clean Water Act (CWA) Section 404 permit will be required to authorize filling of wetlands with soil and rock during construction of mine support facilities including building foundations,

pads for stockpiles and equipment operation, haul roads and access roads, and overland conveyor structures. Overburden from the initial box cut and overburden from mining operations will be dredged and excavated, and over 5,000 acres of wetlands will be removed during this intensive, long-term operation. Wetlands will also be filled with overburden and interburden materials removed to uncover the coal to be mined.

If permitted in accordance with the Alaska Surface Coal Mining Control and Reclamation Act (ASCMRA), the Chuitna Coal Project will require dredging, excavation, and complete removal of a large portion of the upper Chuitna River Watershed. The CWA Section 404 permit authorizes the filling of wetlands; however, it does not specifically address the intensive and extensive dredging and excavation of wetlands, streams, lakes, and aquatic habitat that will be required to construct and operate the Chuitna Coal Project.

The potential impacts of dredging and excavation should be recognized and evaluated in the SEIS, and the other permits and permitting processes, such as ASCMCRA permit applications, that authorize the dredging and excavation required to construct and operate the Chuitna Coal Project should be identified in the SEIS.

Impacts to Fish, Wildlife, and Aquatic Resources

The proposed project poses intense and severe impacts to the geology, hydrology, aquatic habitat, fish, and wildlife of the project area and will alter the ecology and natural resources of the area for over 50 years. These intensive impacts will result in an irreversible and irretrievable commitment of natural resources. The SEIS should recognize, describe, and evaluate these impacts thoroughly and objectively, and to the extent that mitigation measures are proposed, the SEIS should describe the impact to these resources in the event that mitigation measures fail partially or completely.

Misrepresentation of Impacts

Based on NEPA requirements, an environmental impact statement (EIS) is designed to provide basic information to the public. This need to provide concise and summarized information may limit the capacity of the SEIS to capture the true depth, breadth, and consequences of a proposed action. In this case, the PDSEIS does not recognize or assess the impacts and environmental consequences of removing the upper Chuitna Watershed from the intact and fully functioning Chuitna River Basin. More disconcerting is the fact that this PDSEIS routinely minimizes these impacts by referring to the impacts as “temporary disturbances” to natural resources. This misrepresentation of the intensive, severe, and long-term impacts to the natural resources of the Chuitna watershed is repeated throughout Chapter 3 of the PDSEIS, which is intended to describe the affected environment, impacts, and proposed mitigation. This mischaracterization of the impacts also results in an inadequate discussion and assessment of

the impacts of the proposed project to Cook Inlet, one of the major fisheries of Alaska into which the Chuitna River flows.

While the PDSEIS includes major critiques and comments related to the potential of successfully reclaiming or restoring aquatic habitat, it does not address these challenges, but instead seems to minimize and trivialize them. Additionally, the PDSEIS fails to holistically describe and assess the impacts to the ecosystem/watershed function, services, and processes. It also fails to describe and assess the impacts to the area from constructing and operating a surface coal mine and surface facilities of unprecedented size and intensity in an area that is remote and isolated, currently accessible only by airplane or boat, and has no direct road access from populated areas.

Impacts to Water Resources and Hydrologic Functions

The PDSEIS states that the project is not water dependent. This characterization is inaccurate and misleading, since construction and operation of the project will require the removal of entire intact streams, tributaries, wetlands, and ponds from a pristine, wild, and functioning watershed. This impact will occur over 30 years and will result in irreparable and irreplaceable destruction of an interconnected ecosystem and loss of the biodiversity and functional habitat and services currently provided to the Chuitna watershed. Mitigation of such impacts and restoration of intensely impacted areas of this nature, quality, and scale has never been attempted. The example restoration projects provided in the PDEIS are not comparable in size, scope, and complexity, and these examples do not represent the watershed-scale re-creation that would be required to repair or replace this intact ecosystem, its physical and biological processes, and its functional habitat. The probable impacts of unsuccessful reclamation and restoration should be recognized, quantified, and evaluated in the SEIS.

Areas downstream of the mine operations area are also vulnerable to adverse impacts from surface coal mining operations. Potential impacts to downstream areas include: disrupted sediment transport; loss of interstitial spaces due to disrupted sediment transport; compaction of substrates; loss of detritus and nutrients; changes to water chemistry; loss of macroinvertebrates and fish prey; disruption of high and low flow regimes, groundwater upwelling, aquifer recharge, and hyporheic function; loss of hydrological and geomorphological processes and function; and detrimental changes in temperature regimes, physical and biological processes, riparian and terrestrial habitat, and soil ecology. For example, peat wetlands develop over thousands of years. Such peat wetlands are irreplaceable, cannot be stockpiled and stored, and cannot be re-created. Additionally, peat wetlands are characterized by unique water chemistry. Removal of peat and altering of the associated water chemistry would impact fish migration particularly for anadromous species.

Feasibility of Restoring and Replacing Natural Resources Lost

Regarding proposed mitigation of these large-scale and intensive impacts, the figures in the PDSEIS show proposed mitigation sites as 74 acres comprised of a series of separate sites downstream of the mine area. The PDSEIS then compares these proposed mitigation sites to the much larger mine area that will be removed from the Chuitna watershed and ecosystem and blocked to fish passage for over 30 years. The PDSEIS then concludes that there will be mostly only moderate impacts to fisheries and the ecosystem. This conclusion and corresponding claims should be based on recognition of the probable impacts of removing the upper Chuitna watershed and recognizing that methods of restoration or replacement of the natural resources sacrificed for the Project are untried and unproven, and the probability of success in restoring or replacing these valuable resources is very low.

Recreating a functioning watershed is virtually impossible. Based on several attempts and well-intentioned efforts during the past three decades, we know that humans cannot replicate or improve intact aquatic systems. Simply digging channels, rerouting streams, and redirecting water will not replace the existing diverse and functioning ecosystem. Removing streams, tributaries, wetlands, and ponds from a watershed for over 30 years will result in long-term losses of these resources.

Impacts to Fish and Wildlife

With respect to impacts to fish, the PDSEIS takes a species-centric approach focusing primarily on coho salmon. Because several streams, tributaries, wetlands, and ponds will be removed for over 50 years, several fish species, including Chinook salmon, will be impacted. Chinook is in decline in the Chuitna watershed and the Alaska Department of Fish and Game (ADFG) has identified Chinook a "stock of management concern." Additionally, other fish, birds, mammals, amphibians, aquatic and terrestrial insects, and aquatic and terrestrial plants will be impacted. Restoration and mitigation plans need to support all existing species and habitats (e.g., aquatic, riparian, and terrestrial) in the watershed. Removing streams, tributaries, wetlands, and ponds from a watershed for over 30 years will adversely impact and may eradicate anadromous and resident distinct fish population stocks found in the smaller tributaries. These fish species and populations have evolved over time concurrently with the watershed and have developed unique connections and adaptations to the specific habitats throughout the Chuitna watershed. These smaller and unique stocks are important to the overall health of fisheries in that they ensure genetic diversity and resiliency throughout the watershed. The PDSEIS minimizes these impacts by projecting successful mitigation. The potential impacts on fish and wildlife associated with unsuccessful mitigation should be recognized and thoroughly assessed.

The PDSEIS relies on limited fish data collected over a few years on a few days during a few months of the year. This limited information is inadequate to represent the full range of intricacies of the aquatic system throughout the year and between spawning runs. As recommended by ADFG during the past few years, additional fish surveys are needed in the area to provide more robust data on fish and fish productivity in the watershed.

Climate Change Impacts

The subject project poses major impacts related to climate change, which in large part cannot be avoided or mitigated. The total estimated greenhouse gas (GHG) emissions that would be contributed by the Chuitna Coal Project are approximately 19,463,700 metric tons per year of carbon dioxide gas equivalents (CO_2e). Of this total, approximately 17,974,300 metric tons per year CO_2e are from burning the coal at end use. The GHG emissions from burning Chuitna coal represent over 92 percent of the total estimated GHG emissions from the Project. This poses an extremely high and intensive potential impact; therefore, the assumption stated in the PDSEIS that Chuitna coal will replace some other coal, rather than being burned in addition to other coal, should be thoroughly evaluated, and the potential impact of burning Chuitna coal in addition to other coals and releasing these emissions of GHGs and other air pollutants into the atmosphere should be recognized and evaluated in the SEIS.

GHG emissions from burning Chuitna coal would be directly proportional to the demand and consumption of this coal. If demand decreases substantially, there may not be a market for 12 million metric tons per year of Chuitna coal, and the mine production rate would decline accordingly. On the other hand, if demand increases sufficiently, the tonnage of Chuitna coal sold and burned would likely be in addition to other coal available in the same market. Therefore, GHG emissions from burning Chuitna coal would be in addition to GHG emissions from other coals. The impacts associated with this range of possible scenarios should be quantified and evaluated. These are vitally important factors with respect to the potential economic benefits and environmental costs of the Chuitna Coal Project; therefore, claims that Chuitna coal burning may have a minor or negligible overall contribution to GHG emissions should be questioned.

Human Health Impacts

The evaluation of environmental consequences related to human health is still to be completed pending finalization of a Health Impact Assessment (HIA) for the proposed project, and does not provide a basis for evaluating project impacts. As currently written, the chapter on human health (Chapter 3.24) fails to make critical connections between project impacts on subsistence resources, cultural resources, socioeconomic impacts, and human health.

Alaska's Health Impact Assessment guidance, referenced in Chapter 3.24, acknowledges that some of the most challenging health issues for Alaskans are social and cultural changes that produce psychological distress resulting in adverse health behaviors. One of the most common examples is community fear that a project will affect their subsistence foods. The discussion of human health impacts should be integrated with and adequately consider connections between subsistence resource use, cultural resources, socioeconomics, and human health. When this

section is completed it should be redistributed for Cooperating Agency review prior to public review and comment.

China is the world's largest consumer of coal and the burning coal in China affects millions of people and is a major health concern. The human health impacts of burning Chuitna coal in China should be recognized and assessed in the SEIS.

Socioeconomics

The PDSEIS does not address sport fishing and the economic impacts related to losses of the sport fishery in the area. The following information is not included in the PDSEIS: According to ADFG, the Chuitna River is the most productive Chinook salmon river flowing in to the West Cook Inlet Management Area (WCIMA), and the river is the most popular Chinook salmon sport fishery in the WCIMA. However, the Chinook stock in the Chuitna River is in decline and in 2010, ADFG recommended to the Alaska Board of Fisheries (BOF) that Chuitna River Chinook salmon be given a "stock of management concern" status and the stock was recognized as such in subsequent years (ADFG, 2010, 2011, 2012, 2013). Given the importance of this stock to sport, commercial, and subsistence fishery groups in the area, and the severe impacts to the Chuitna watershed associated with development of a coal mine of this scale, the SEIS should include this stock status information and take this status designation into consideration when discussing impacts and mitigation.

The PDSEIS should evaluate the ecosystem service benefits provided by and the impacts that would occur the Chuitna River Watershed as a result of this project. The PDSEIS does not adequately consider or evaluate the impacts to the region if the already identified Chinook salmon stock of concern is further reduced by this project. Additionally, the PDSEIS does not adequately address the impacts to the region if sport fishing for this Chinook stock and other salmon species is reduced or closed due to impacts from this project. Salmon fisheries are a renewable resource if their watersheds are healthy and intact, but once a watershed is destroyed it can have long-lasting economic impacts to a region in the form of reduced or eradicated stocks which ultimately result in closed commercial, sport, and subsistence fisheries.

The PDSEIS neglects to adequately address and evaluate the economic impacts related to the potential loss of a reliable protein food resource for subsistence residents in Tyonek and Beluga. Negative impacts to subsistence resources would further burden the economic stability of the subsistence users in the area as they would be required to travel long distances to populated areas across Cook Inlet, via boat or plane, to obtain food.

This should include an assessment of the project on commercial, sport, and subsistence fishing and hunting as a result of the watershed ecosystem impacts. This assessment should also include evaluation of mental, physical, and economic impacts to community members due to alteration and potential loss of an intact ecosystem and healthy subsistence resources.

The discussion of socioeconomic impacts on the NVT (Section 3.20) is focused on what are considered to be high intensity, beneficial effects related to employment and income. However, this section fails to adequately evaluate the potentially adverse impacts to the subsistence economy of the community from "15 to 20 percent of the total adult population" being employed by the mine and potentially unavailable to participate in community subsistence and cultural activities. As noted in Section 3.23:

> "Participation in the subsistence harvest of traditional foods, including preparation, eating, and sharing of resources makes a vital contribution to the social, cultural, and spiritual well-being of users and their communities… [s]haring food is a primary way of maintaining and strengthening extended kin networks and more distant social bonds. The sharing of subsistence foods also provides security and a sense of mutual aid for rural residents living in a challenging natural setting."

Also:

> "Subsistence activities often require cooperation. Tasks related to the harvest reinforce ties among generations and extended families in rural communities. Sharing is also an important subsistence value, particularly because a small number of households often supply a large portion of subsistence resources in rural communities."

The discussion of socioeconomic impacts must include an evaluation of the potential adverse, and potentially long-term, impacts to the subsistence economy and culture (including the transmittal of traditional ecological knowledge) of the NVT of employing 15 to 20 percent of the adult population outside the community.

Mitigation Effectiveness

The applicant has proposed measures to mitigate project impacts to wetlands, other surface waters, and site hydrology that are unprecedented in scale and complexity, and whose effectiveness is unproven and highly uncertain. The PDSEIS should thoroughly discuss the predicted effectiveness of measures to mitigate impacts under each of the alternatives (including providing evidence to demonstrate the effectiveness of the proposed measures), and take a hard look at the potential environmental consequences should the proposed measures be partly or wholly unsuccessful.

Due to the unproven nature and unprecedented scale of the proposed mitigation measures, there may not be sufficient information for the USACE to determine compliance with guidelines associated with required permits.

Reasonably Foreseeable Significant Adverse Impacts

In accordance with NEPA, the SEIS must include a discussion of reasonably foreseeable significant adverse effects on the human environment. As defined in the NEPA regulations (40 CFR 1502.22), reasonably foreseeable "includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason." The PDSEIS lacks discussion of potentially catastrophic consequences resulting from accidents, such as fuel spills, or the failure of proposed mitigation measures to restore the hydrologic balance or the ecological function of impacted streams and wetlands. Given the scale, complexity, and location of the proposed project, the possible failure of resource mitigation measures or failure of measures to prevent accidental chemical releases are reasonably foreseeable and should be discussed.

Specific Comments

The attached table summarizes our specific comments in the form provided by USACE.